

## **REMARKS**

The present application relates to a process for the preparation of beads having a crosslinked inorganic matrix, which have a size in the millimeter range. Claims 1-29 are pending in the application. In this response claims 1, 6-8, 11, 13, 23, and 29 are amended. Entry of these amendments and reconsideration of the present application are respectfully requested in view of these amendments and the following remarks.

### **Rejections Under 35 U.S.C. §112**

In the outstanding office action, Claims 1-29 were rejected under 35 U.S.C. §112, first paragraph as being based on a specification which is not enabling. It was asserted that the claims as amended in the previous office action failed to include an essential step of the claimed process. Applicants respectfully traverse this rejection to the extent it is asserted that the present specification is not enabled, but address the concerns raised regarding the phrasing of certain terms of the present claims.

In the present response, independent claim 1 is amended to specify a process "which comprises pouring a suspension comprising a precursor of the inorganic matrix and an alginate drop wise into a solution of a polyvalent cation salt with a pH of less than 3, in which the alginate gels." It is respectfully submitted that claim 1 as presently amended makes clear that the gelling step of the process is pouring specified suspension containing an alginate into the solution of polyvalent cation salt. Applicants respectfully request that the rejection of claim 1, and claims 2-29, which depend from claim 1, either directly or indirectly, on this basis be withdrawn.

Claims 4, 6-13, 15, 23-27, and 29 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It was asserted that in claims 4, 10-11, and 15, which depend either directly or indirectly from claim 1, it is unclear where the step of "gelling of the alginate" fits in the process of claim 1. It was further asserted that the term "gelling" has no clear antecedent basis in claims 6-9 and 12-15.

As indicated above, claim 1 has been amended in this response to specify a process "which comprises pouring a suspension . . . into a solution of a polyvalent cation salt with a pH of less than 3, in which the alginate gels." (Emphasis added.) It is believed that this amendment makes clear that the "gelling of the alginate" occurs when the suspension containing the alginate is added drop wise to the solution of the polyvalent cation salt with a pH of less than 3. Applicants respectfully assert that the amendment of claim 1 overcomes the rejection of claims 4, 10-11, and 15, which depend from claim 1, as being indefinite under 35 U.S.C. § 112, second paragraph and ask that the rejection of claims 4, 10-11, and 15 on this basis be withdrawn.

In the outstanding office action, claims 6 and 8 were asserted to be indefinite because the term "gelling" has no clear antecedent basis. Claims 9, 12, and 13 were asserted to be indefinite in view of their dependency from claims 8 and/or 24. In this response, claims 6 and 8 are amended to refer to a compound capable of "crosslinking," which is believed to overcome this rejection. Applicants respectfully ask that the rejection of claims 6, 8, 9, 12, and 13 as being indefinite on the basis that the term "gelling" has no antecedent basis be withdrawn.

Claim 23 has been rejected as being indefinite because the product as recited is inconsistent with what is defined in claim 1 from which it depends. In this response claim 23 is amended to recite "a material formed of beads suspended in an aqueous medium wherein the beads are obtained by the process of claim 1," which is believed to be consistent with the product defined in claim 1. Applicants respectfully ask that the rejection of claim 23 as being indefinite, in that it is inconsistent with the product defined in claim 1, be withdrawn.

Claims 24-27 have been rejected as being indefinite in that the term "gelling" in claim 24 has no antecedent basis. In this response, claim 24 is amended such that the phrase "agent for gelling the alginate" has been replaced with the phrase "solution of the polyvalent cation salt with a pH of less than 3." It is submitted that this clarification overcomes the rejection of claims 24-27 as being indefinite in that the term "gelling" is no longer used to describe the polyvalent cation salt solution, which is the agent for gelling the alginate of the process of claims 24-27. Applicants respectfully ask that the rejection of claims 24-27 on this basis be withdrawn.

Claim 29 was rejected as being indefinite as the term "compound" had no antecedent basis. In this response claim 29 is amended so that it depends from claim 27, rather than claim 24. It is believed that this amendment overcomes the rejection of claim 29 as being indefinite in that the term "compound" has no antecedent basis. Applicants respectfully ask that the rejection of claim 29 on this basis be withdrawn.

#### **Rejections Under 35 U.S.C. §102(b)**

Claims 1-29 were rejected under 35 U.S.C. § 102(b) as anticipated by Gerk, U.S. Patent No. 4,574,003 ("the '003 patent") as set forth in the previous office action

and further discussed in the outstanding office action. Applicants respectfully traverse this rejection.

Anticipation of the pending claims can be found only if the cited reference shows exactly what is claimed. See *Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773, (Fed. Cir. 1985). The '003 patent does not describe a process for preparing beads which have a crosslinked inorganic matrix with a size controlled in the millimeter range. Rather, the '003 patent discloses a process for forming dense, alumina-base ceramics. Moreover, the '003 patent does not teach conditions that allow the preparation of beads such as those produced by the process of claim 1, nor does it disclose beads that are obtained by a sol-gel process. In addition, the '003 patent does not disclose the use of an alginate, or the gelling of a compound similar to an alginate in a process for producing beads. The description of the process of the '003 patent does refer to "gelling the dispersion," but this refers to the gelling of the mineral oxide used in the process for preparing alumina-based ceramics. Because the '003 patent does not disclose the subject matter of claims 1-29, Applicants believe the rejection of the pending claims as being anticipated by the '003 patent is improper and respectfully ask that the rejection of claims 1-29 as being anticipated by the '003 patent be withdrawn.

Claims 1-29 were also rejected under 35 U.S.C. §102(b) as anticipated by Motai et al., U.S. Patent No. 4,797,358 ("the '358 patent") and Dziedzic, U.S. Patent No. 4,063,856 ("the '856 patent"), as set forth in the previous office action and further discussed in the outstanding office action. Applicants respectfully traverse this rejection.

Although the '358 and '856 patents disclose processes involving the formation of beads by gelling of an alginate, the conditions of those processes differ significantly from the process of the present application and produce products that differ significantly from the beads prepared by the process of the present application. Neither patent discloses the use of a polyvalent salt solution with a pH of less than 3 as a gelling agent for the alginate. Moreover, neither the '358 patent nor '856 patent discloses crosslinking a precursor of an inorganic matrix by a sol-gel process. Thus, the spheres produced by the processes disclosed by the cited patents differ from those of the present application in that they do not contain the specific solid crosslinked inorganic matrix found in the beads prepared by the process of the present application. Because neither the '359 nor the '856 patents disclose the processes or the products of the processes of the claims of the present application, the cited patents do not anticipate the processes as presently claims. Applicants respectfully request that the rejection of claims 1-29 of the present application as being anticipated by the '359 or the '856 patents be withdrawn.

### **Rejections Under 35 U.S.C. §103**

Claims 1-29 were also rejected under 35 U.S.C. § 103 as being obvious in view of the '003 patent, the '358 patent and/or the '856 patent. The disclosures of the cited patents are discussed individually above. None of the three cited patents suggests a process for preparing beads that includes pouring a suspension containing a precursor of an organic matrix and an alginate into a polyvalent cation salt, in which the alginate gels, and the precursor of the inorganic matrix is crosslinked in a gel-sol process. Applicants respectfully traverse the rejection of

claims 1-29 as being anticipated by either of the '003, the '358, or the '856 patents considered individually or in an combination.

The '003 patent, which is the only cited reference that involves a process that includes crosslinking of a precursor, is a process for preparing ceramics. That process produces a ceramic gel, which is spread in glass or metal trays, oven dried, and then crushed by hand using a mortar and pestle or by other means. See for example, the '003 patent at column 5, lines 61-65 and column 8, lines 30-33. Thus, the person of skill in the art in need of a process for preparing beads would find no motivation or suggestion or other useful instruction in the disclosure of the '003 patent.

The only cited prior art that discloses processes for obtaining beads that consist of an alginate gel are the '358 and '856 patents. These documents disclose processes in which gelling of the alginate is implemented in the presence of mineral particulates such as silica (the '358 patent) or an oxide or an oxide precursor (the '856 patent.)

The '358 patent discloses a method for making a gel containing entrapped biological materials such as a microorganism or an enzyme. Nothing in the cited patent suggests the process or the beads produced by that process taught by the present application.

The '856 patent describes a particulate product of self-supporting spheres containing inorganic material, which are also described as spheres containing particles dispersed in a gelled fugitive organic binder matrix. See for example, the '856 patent at column 1, lines 18-22. Unlike the subject matter of the present

application, the spheres of the '856 patent are produced using non-crossed linked mineral particles.

Thus, nothing in the disclosures of the '003 patent, the '358 patent, or the '856 patent taken individually or together would have made the process and the beads produced by that process that is disclosed in the present application obvious to one of skill in the relevant art. Applicants respectfully request that the rejection of claims 1-29 of the present application as being obvious be withdrawn.


Applicants believe that the claims of the present application are in condition for allowance and respectfully ask for a timely notice to that effect. The examiner is encouraged to contact Applicants' representative directly if matters of an informal nature are raised by this response which can be dealt with in a telephone conference.

Respectfully submitted,

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